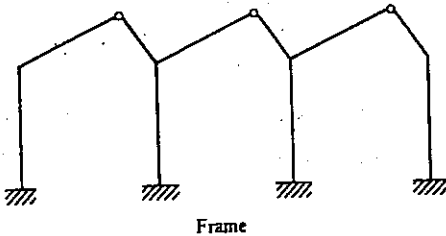
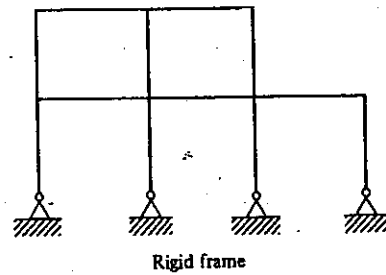
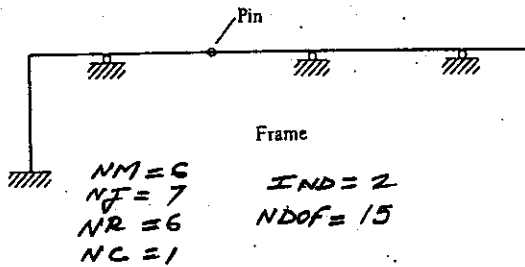
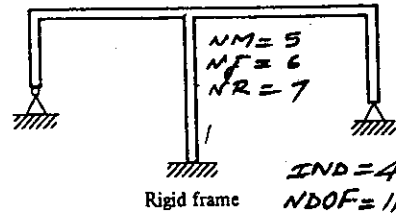
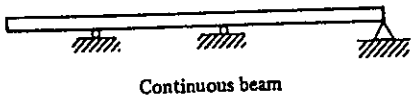


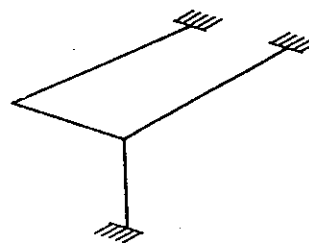
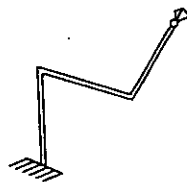
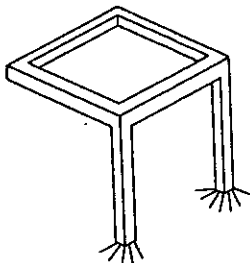
For each of the following structures, determine the degree of indeterminacy and the number of degrees of freedom.

(a)

$$\begin{aligned}
 NM &= 3 & IND &= 3(3) + 4 - 3(4) \\
 NF &= 4 & &= 1 \\
 NR &= 4 & NDOF &= 3(4) - 4 = 8
 \end{aligned}$$

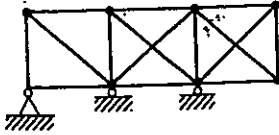


(b)



©

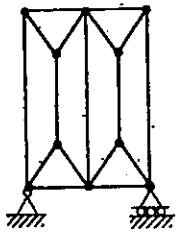
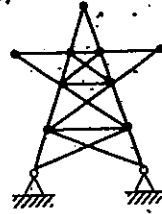
NM = 15
NR = 4
NJ = 8
IND = 3
NDOF = 12



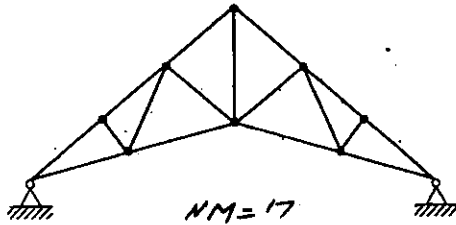
NM = 5
NR = 4
NJ = 4
IND = 1
NDOF = 4



NM = 21
NR = 4
NJ = 11
IND = 3
NDOF = 18

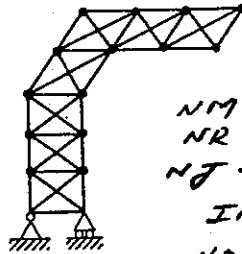


NM = 17
NR = 3
NJ = 10
IND = 0
NDOF = 17



Planar Trusses

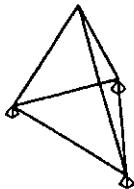
NM = 17
NR = 4
NJ = 10
IND = 1
NDOF = 16



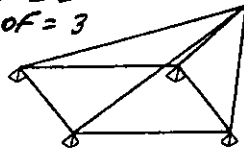
NM = 36
NR = 3
NJ = 16
IND = 7
NDOF = 29

(D)

$$\begin{aligned}
 NM &= 6 \\
 NJ &= 4 \\
 NR &= 9 \\
 IND &= 3 \\
 NDOF &= 3
 \end{aligned}$$

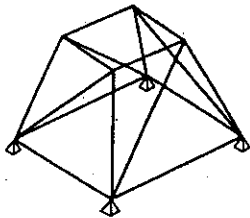


$$\begin{aligned}
 NM &= 8 \\
 NJ &= 5 \\
 NR &= 12 \\
 IND &= 5 \\
 NDOF &= 3
 \end{aligned}$$



$$\begin{aligned}
 NM &= 15 \\
 NJ &= 8 \\
 NR &= 12
 \end{aligned}$$

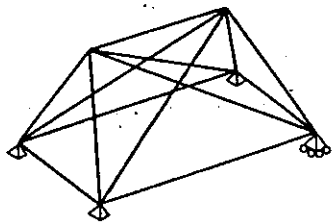
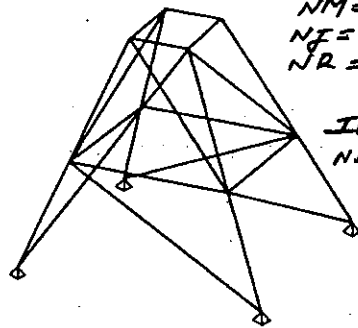
$$\begin{aligned}
 IND &= 4 \\
 NDOF &= 12
 \end{aligned}$$



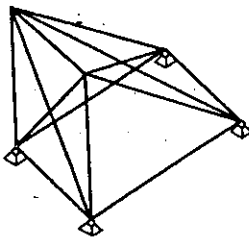
Space Trusses

$$\begin{aligned}
 NM &= 24 \\
 NJ &= 12 \\
 NR &= 12
 \end{aligned}$$

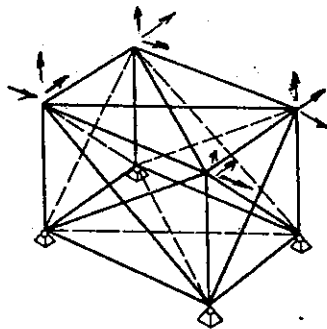
$$\begin{aligned}
 IND &= 0 \\
 NDOF &= 24
 \end{aligned}$$



$$\begin{aligned}
 NM &= 13 \\
 NR &= 10 \\
 NJ &= 6 \\
 IND &= 5 \\
 NDOF &= 8
 \end{aligned}$$



$$\begin{aligned}
 NM &= 13 \\
 NJ &= 6 \\
 NR &= 12 \\
 IND &= 7 \\
 NDOF &= 6
 \end{aligned}$$



$$\begin{aligned}
 NM &= 24 \\
 NJ &= 8 \\
 NR &= 12 \\
 IND &= NM + NR - 3(NJ) \\
 &= 24 + 12 - 3(8) \\
 &= 12 \\
 NDOF &= 3(8) - 12 \\
 &= 12
 \end{aligned}$$